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Novel Liposuction Techniques for the Treatment of HIV-Associated Dorsocervical Fat Pad and Parotid Hypertrophy

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1. Introduction

Liposuction since its beginning has been used primarily for contouring localized deposits of fat to give its recipients an improved cosmetic appearance. The most common areas to which liposuction techniques have been applied are the abdomen, flank region, thighs, and submental neck. Since the advent of the tumescent technique in the late 1980s, including the use of local anesthesia and small diameter cannulas, the safety of liposuction has been established. Along with safety has come the application of the liposuction technique to medical conditions including non-fatty tissues, such as the removal of salivary gland tissue in the treatment of axillary hyperhidrosis and the combined glandular and fatty tissue of gynecomastia.

This chapter will examine the application and efficacy of the liposuction technique in treating two common and related conditions found in human immunodeficiency virus (HIV) positive patients: the dorsocervical fat pad and bilateral parotid hypertrophy in the broader context of HIV lipodystrophy. The procedures described herein avoid general anesthesia and utilize the awake patient as a participant in the procedure to optimize reduction of the hypertrophic tissue. In the case of the dorsocervical fat pad, the positioning of the patient in the seated upright position results in a more effective and complete suctioning than in the traditional prone position. A bonus is that this position is more comfortable for the surgeon, in reducing operating room fatigue. In the case of parotid hypertrophy, using an established technique such as liposuction, can be shown to provide an excellent reconstructive and cosmetic result while providing a better safety profile than other treatment options. Our experience in the use of these procedures indicates that patients rate their experience and satisfaction with the procedures as very high.

Current procedural terminology (CPT) and international classification of disease (ICD) codes are provided to improve insurance provider reimbursement for patients.

2. Lipodystrophy

Since the advent of highly active antiretroviral therapy (HAART), people with HIV infections and acquired immunodeficiency syndrome (AIDS) are living longer and better

lives(Taiwo et al. 2010). A side effect attributable to HAART is the development, in some patients, of a complex of signs and symptoms collectively referred to as lipodystrophy. HIV lipodystrophy is manifested by a constellation of anthropometric changes, including lipoatrophy of the face, extremities, and buttocks(Tien and Grunfeld 2004) as well as lipohypertrophy in the upper back, commonly called "buffalo hump" or dorsocervical fat pad. Fat loss in the face and extremities conveys a falsely cachectic appearance to patients who are otherwise healthy. Patients with lipodystrophy also commonly have increased abdominal adiposity, chest adiposity, and increased glandular breast tissue, the latter known as gynecomastia. While some patients have only lipoatrophy(Grunfeld et al. 2010), others over time develop signs and symptoms of lipohypertrophy as well. Many patients have associated internal and metabolic abnormalities such as diabetes, advanced coronary disease, and cardiomyopathy.(Carr et al. 1998; Domingo et al. 1999; Safrin and Grunfeld 1999; Murata et al. 2000; Petit et al. 2000)

Another less recognized feature of lipodystrophy is bilateral parotid hypertrophy. (Sooy, 1987) Enlargement of the parotid glands, the largest of the salivary glands, is commonly seen in HIV positive patients(Tall et al. 1985) and is often referred to in the HIV community as "chipmunk cheeks" as it imparts a fullness to the lateral cheek area. While HAART is often cited as its causation, as with lipodystrophy, its etiology is unknown.

The first part of this chapter will focus on the lipohypertrophy of the dorsocervical fat pad and a novel method of removing it with liposuction under local tumescent anesthesia. The second part of this chapter will focus on the removal of the lateral portion of the hypertrophied parotid gland in an equally novel but different approach using a technique borrowed from liposuction.

3. Dorsocervical fat pad

3.1 Background

The dorsocervical fat pad represents a subcutaneous, non-encapsulated accumulation of adipose tissue with a striking fibro-connective tissue component. The authors prefer the term "dorsocervical fat pad" to "buffalo hump" as it is more descriptive and accurate medical terminology, while the latter potentially denigrates already the situation for the cosmetically-embarrassed or depressed patient.(Steel et al. 2006; Crane et al. 2008) Aside from dramatic changes in appearance leading to depression and social withdrawal, patients with dorsocervical fat pads may complain of headaches, difficulty with sleep, decreased range of motion, and an inability to fully extend the neck due to the physical size of the mass.

There is general agreement in the medical community that liposuction is a safe and effective method of reducing the size of the dorsocervical fat pad.(Ponce-de-Leon et al. 1999; Piliero et al. 2003) The authors of this article have seen poor outcomes for many patients after attempted removal of the fat by direct surgical excision. The poor outcomes include only minimal reduction of the size of the fat pad while leaving long and unsightly scars. We have also seen suboptimal results in patients in which liposuction was performed in an effort to reduce the fat pads. One of the main reasons for the poor outcomes associated with liposuction of the dorsocervical fat pad is that these patients have all been placed in the prone position during the liposuction procedure. In the prone position, the dorsocervical fat pad recedes between the scapula and is harder to access. Neck extension in the prone position further anatomically distorts the cervical fat pads. This can be observed simply by

placement of the patient in the prone position and visibly noting the dorsal surface region. The dorsocervical fat is flattened and less demonstrable in the prone position as compared to the upright, anatomic position. Access is further impeded by the placement of the occiput in the prone position. The cephalad portions of the lesion are inaccessible to cannula insertion, rendering significant sections of the fat pad inoperable in the prone position. This is especially true for patients with lipodystrophic fat accumulation in the posterior neck and occipital scalp region, in which neck flexion is essential to cannula insertion. In this article, we propose an alternate positioning of the patient, which we feel gives far superior results. The patient is awake and seated in an upright position with the legs dangling off the edge of the operating table. With this technique, the surgeon stands behind the patient, allowing the surgeon greater access to all of the tissue. Having a patient awake allows his/her assistance in the positioning, providing a more complete removal of tissue and, therefore, a more successful outcome.

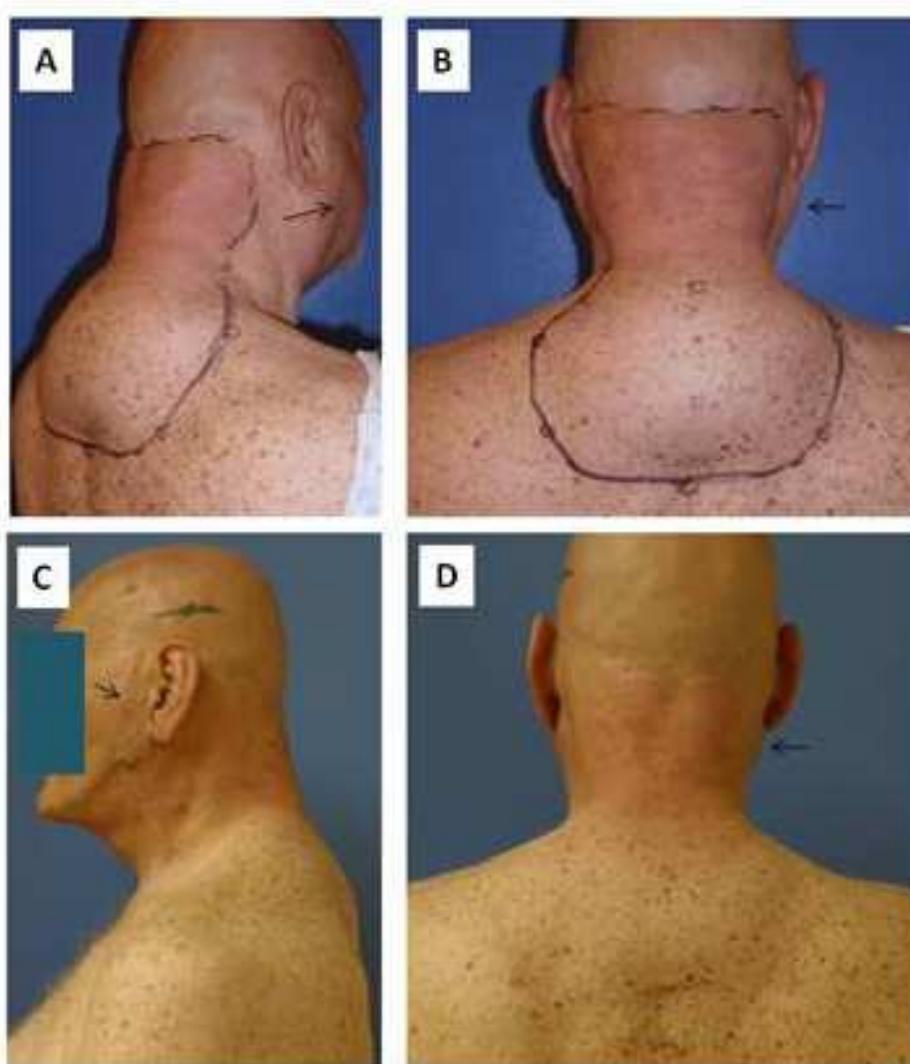


Fig. 1. HIV infected man on HAART with a dorsocervical fat pad before and after lipoaspiration. A. Outlined dorsocervical fat pad prior to aspiration with black arrow pointing to parotid hypertrophy, B. Outlined dorsocervical fat pad with incision circles prior to aspiration with black arrow pointing to parotid hypertrophy, C. Postsurgical resolution of parotid hypertrophy and improved dorsocervical fat pad, D. Much improved dorsocervical fat pad and parotid hypertrophy (arrow).

Physical examination of the dorsocervical fat pad

Physical examination of the patient with a dorsocervical fat pad reveals a fatty tissue buildup on the upper back which can be generally categorized as small, medium, large and extreme. There is no measurement guide to enable classification into these size categories. The fat accumulation in the dorsocervical area is subcutaneous and causes no changes to the skin itself, therefore, the overlying skin appears normal. Palpation reveals fat pads that are rather discrete, firm and immobile (unlike lipomas). Palpation often reveals that these masses extend into the posterior neck and nuchal regions of the occipital scalp. (Figure 1) Extension into the posterior neck and scalp deforms the normal dorsocervical angle and imparts a somewhat equine appearance to the neck. Rarely is there any pain associated with palpation, although patients report symptoms caused by these fat pads such as difficulty lying down, interference with sleep, and pain radiating to the shoulders and arms. Social withdrawal symptoms may be present, especially for patients with large, noticeable fat pads. These lesions are usually so characteristic, that it is not necessary to get any kind of diagnostic or radiographic confirmation with computed tomography (CT) or magnetic resonance imaging (MRI).

3.2 Novel method for liposuction of the dorso-cervical fat pad

The patient is prepared for local, tumescent liposuction in the pre-operative area. While in the pre-operative room the patient disrobes and puts on a hospital gown. Photographs are taken with the patient's back to the camera in silhouette to document the pre-operative size and location. With the patient in a seated position, and legs dangling off the edge of the exam table, the entire back and posterior neck are cleaned with alcohol. The peripheral border of the dorsocervical fat pad is outlined with a pen in a continuous line (Figure 1). Five small circles are made approximately 2 cm from the outer boundary of the fat pad in a clockwise manner at 1, 4, 6, 8 and 11 o'clock although this may vary slightly per patient (Figure 1B; Figure 2B). These are the entrance points for both the infusion and suction cannulae. Ordinarily five incision sites (ports) are used but for smaller fat pads, three may be sufficient. Each of the circled sites is injected with 1 cc of lidocaine 1% and epinephrine 1:100,000. The patient is pre-medicated with hydrocodone 5 mg and alprazolam 0.5 mg by mouth for pain and anxiety relief, and with lincomycin 600 mg I.M. for antibiotic prophylaxis.

The patient is then escorted into the operating room and instructed to sit on the edge of the operating table allowing the surgeon to position him/herself behind the patient (Figure 2A, 2C). During the surgery, the patient's vital signs are continuously monitored using pulse oximetry, sphygmomanometry and electrocardiography. A medical stand with pillow is placed in front of the patient to lean on for support. The patient is prepped and gowned in a standard sterile fashion. The surgeon makes 3 mm incisions into the previously anesthetized peripheral circular sites using a #11-blade surgical scalpel. Tumescent fluid consisting of lidocaine and epinephrine buffered with sodium chloride (see below) is infiltrated liberally throughout the entire fat pad and allowed to sit for 15 to 30 minutes in order to achieve maximal vasoconstrictive effect.

The tumescent fluid is prepared in the operative suite as follows: 1-2 vials of 50 mL lidocaine 1% and epinephrine 1:100,000 and 10 cc of sodium bicarbonate 8.4% are added to 1,000 mL of 0.9% saline solution. Using two 50 mL vials of Lidocaine 1% and epinephrine 1:100,000

results in a lidocaine concentration of 0.1%. Infusing 1,000 to 1,500 cc allows for adequate tumescence without undue risk of lidocaine toxicity.

Using a 3 mm Becker, or similar cannula, thorough and meticulous liposuction is carried out using all 5 of the peripheral incision points (ports) employing a crisscross pattern over the entire expanse of the fat pad. The cannula is shifted every 16th of an inch angling up and over the entire breadth of the fat pad. For example, lipoaspiration will begin horizontal at the 6 o'clock port each time angling a 16th of an inch in a more vertical position going up and down, to and fro until the 12 o'clock position then working down on the opposite side again shifting every 16th of an inch. This same method is used at all incision sites. The neck and the occipital scalp can be accessed using these same incision sites provided a cannula of sufficient length is used (Figure 2E).



Fig. 2. HIV infected man undergoing aspiration for dorsocervical fat pad. A. The patient was placed in the sitting position with his feet dangling over the edge of the bed with a pillow rest, B. The dorsocervical fat pad is outlined as are the incision ports, C. The surgeon is able to stand straight up during the aspiration procedure, D. The patient participates in the procedure by flexing the neck, E. The surgeon is able to access all of the dorsocervical fat pad with the assistance of the patient.

During the procedure the patient is asked to bend at the waist when the more cephalad parts of the dorsocervical fat pad are being aspirated and when the surgeon is using the superior ports. The patient position on the table can be angled at any time using the help of an assistant to make the suction more effective and comfortable to the surgeon and to remove as much tissue as possible to avoid recurrence. The patient's head may also be bent

in a flexed position when suctioning the lesions that extend more superiorly into the posterior neck, occipital and post auricular scalp regions (Figure 2D, 2E).

The fat entering the suction tubing from the dorsocervical fat pad appears yellow in color, although some admixture of blood is common. When the fat pad becomes flattened, the aspiration phase is over. The incision sites are closed using #5-0 nylon sutures, approximately two sutures per site. Antibiotic ointment and sterile dressings are applied to the incision sites. The patient is transferred to the post-anesthesia care unit (PACU) where vital sign monitoring is continued. Compression garments are not usually necessary, but the surgeon may recommend them for larger fat pads (25 cm in size and/or situated high onto the posterior head). The patient is discharged after 30 minutes of observation to the care of a family member or friend, at the discretion of the surgeon. Because patients have been pre-medicated with sedatives, they are not allowed to drive themselves home.

After discharge, the patient returns home and is asked to generally rest for 1-2 days. The patient may shower after 2 days and engage in their activities of daily living at this time except for those activities requiring rigorous physical effort such as running or weight-lifting. The sutures are removed after five days and no dressings are generally needed after this time. Exercise can generally be resumed in one week. Patients follow-up in one month and are usually discharged from the office at that time.

3.3 Outcomes after dorsocervical fat pad lipoaspiration of the awake patient

In a recent detailed survey by the authors of one woman and eighteen men with an average age of 52 ± 1.8 (mean \pm sem) years seeking lipoaspiration treatment for HIV-related dorsocervical fat pad, prior to surgery, on a scale of 0-5, five being very affected, 3 being somewhat affected, 1 being a little affected, and zero being not affected, patients felt their appearance was very affected (4.8 ± 0.1), they experienced discomfort (3.5 ± 0.4), their lives were changed somewhat due to the dorsocervical fat pad (3.7 ± 0.4), they had some depression (3.4 ± 0.4) and social withdrawal (3.6 ± 0.4), the fat pad interfered a little, to somewhat during sleep (2.7 ± 0.5), and their posture was somewhat to very affected (3.8 ± 0.4). Within a year after lipoaspiration, by paired student's t-test, there was a $82.1 \pm 6.2\%$ improvement in appearance (average rating 0.9 ± 0.3 ; $P < 0.0001$), a $76.3 \pm 7.9\%$ improvement in discomfort (0.4 ± 0.1 ; $P < 0.0001$), a $54.4 \pm 12.6\%$ improvement in how their lives were changed by the dorsocervical fat pad (1.4 ± 0.25 $P = 0.0006$), a $72.9 \pm 7.5\%$ improvement in feelings of depression (0.7 ± 0.3 ; $P < 0.001$), a significant $81.9 \pm 6.3\%$ improvement in social withdrawal (0.5 ± 0.2 ; $P < 0.0001$), a significant decrease of $59.7 \pm 10.2\%$ in sleep disturbance (0.3 ± 0.1 ; $P = 0.0001$) and a $61.1 \pm 10\%$ improvement in posture (1.3 ± 0.4 ; $P = 0.006$). Eighteen of the patients graded the procedure as completely successful (5/5) and one graded the procedure as 4/5. One person had an infection after the procedure, one had slight pigmentation at the site of the scar and one felt the area was lumpy (2.5/5). On a scale of none (0), to moderate (2-3) to significant (5), patients rated swelling after the procedure at 2.7 ± 0.3 , bruising at 2.0 ± 0.3 , and discomfort at 2.6 ± 0.4 . These data suggest excellent effectiveness of this novel procedure and impressive patient satisfaction and improvement in their quality of life.

4. HIV-related parotid hypertrophy

4.1 Background

The most common HIV-associated salivary gland condition relates to the parotid glands. Originally described in 1985, (Ryan et al. 1985) HIV-associated salivary gland disease affects

1-5% of the infected population (Shanti and Aziz 2009; Schiodt et al. 1989) and usually involves diffuse enlargement of both parotid glands, known as bilateral parotid hypertrophy, although unilateral involvement has been seen. Also known as HIV-associated lymphoepithelial cysts of the parotid gland, they can occur as the initial manifestation of HIV infection or at any stage of the disease. (Shanti and Aziz 2009) While bilateral enlargement is most common, patients with unilateral hypertrophy are also seen. (Tao and Gullane 1991; Ortega et al. 2008) Patients present with a bulging or widening of the lateral cheek area, sometimes giving a chipmunk cheek-like appearance. (Figure 3A) The degree of enlargement varies widely from patient to patient, from a barely discernable widening of the cheek, to an extremely large and disfiguring effect. Facial wasting is common in patients with parotid hypertrophy and generally accentuates the enlarged appearance of the glands. Histologically, the enlarged parotid is characterized by a marked squamous epithelium-lined cystic dilation of the salivary glands surrounded by a lymphoid hyperplasia containing enlarged germinal centers. (Tao and Gullane 1991) Other salivary glands can also be enlarged by uniform follicular hyperplasia or reactive lymphadenopathy with follicular hyperplasia. (Shugar et al. 1988; Rosenberg et al. 1992) A diffuse form of salivary gland enlargement can also occur that is characterized histologically by atrophy of the gland parenchyma, lymphocytic infiltration, and replacement of ducts by solid islands of epithelial and myoepithelial cells. (Heymsfield et al. 1990) While patients rarely have overt symptoms due to gland enlargement, gland hypoplasia can occasionally lead to obstruction of the salivary duct and dryness of the mouth that mimics Sjögren's syndrome. (Schiodt et al. 1992) Rarely, patients report tenderness to touch. (Mandel and Surattanont 2002) Once the parotid gland is enlarged, it tends to persist in size, rarely decreasing. (Schiodt et al. 1992) Many patients with parotid hypertrophy seek care because of a desire for cosmetic improvement especially when the glands are disfiguring. These patients may become reclusive and exhibit other social withdrawal types of behavior; depression is not uncommon. (Beitler et al. 1999)

Prior to the procedure to lipoaspirate the hypertrophied parotid gland as described in this chapter, it is important that the surgeon consult with the patient's primary care physician often in consultation with an ear, nose and throat (ENT) surgeon to rule out parotid hypertrophy due to HIV from other etiologies including bacterial infection with *mycobacterium* or *pneumococcus*, (Hanekom et al. 1995) viral infections with *paramyxovirus* (mumps) (McQuone 1999), autoimmune disease such as with Sjögren's syndrome and rare manifestations including cancers such as carcinoma, Kaposi's sarcoma (Burket et al. 2008), bilateral Warthin's tumors, bilateral cystic pleomorphic adenomas, (Som et al. 1995) or lymphoma, (Wotherspoon and Isaacson 1996) sarcoidosis, necrotic intraparotid lymph nodes and bilateral first branchial cleft cysts (intraparotid). (Michelow et al., 2011) Evaluation of the parotid gland may include imaging such as CT or MRI. (Chapnik et al. 1990)

4.2 Treatment options for parotid hypertrophy

The options to reduce the size of the parotids in HIV-positive patients are: 1) direct surgical excision with a high rate of recurrence; 2) radiation therapy; and 3) a modification of a liposuction technique as described in this chapter. It is the experience of the authors that direct surgical excision and radiation therapy are fraught with complications and often have a high rate of recurrence. Complications of direct surgical excision include those associated with general anesthesia, infection and fistula formation. Radiation therapy complications include the loss of taste, dryness of the mouth, thrush and radiation dermatitis. Although

rare, formation of malignant tumors can occur, usually ten years out from radiation treatment using higher dose treatment modalities.(Beitler et al. 1999) It is the experience of the authors that the most favorable outcome results from using a tumescent liposuction technique that successfully reduces the size of the parotids to a normal appearance without resultant complications. (see Methodology)

4.3 Physical examination of the parotid glands

Physical examination reveals a patient with discernable enlargement of the lateral cheeks. Palpation allows the parotid gland to be easily appreciated. The size of the parotid hypertrophy varies from patient to patient but is generally felt just anterior to the tragus of the ear extending inferiorly and wrapping around the earlobe crease near the sternocleidomastoid muscle. Sometimes the parotid may feel like a hypertrophied masseter muscle but it is the wrapping of the parotid around the earlobe crease that differentiates the enlarged parotid from muscle. It is also important to note that palpation is of the superficial aspect of the gland. The deeper portions of the gland that envelop the facial nerve cannot be palpated. While the enlarged glands are usually not tender, care should be taken on initial palpation as occasionally, some of the glands are tender to touch.

4.4 Methodology for suction-assisted partial parotidectomy

The patient is prepared for local, tumescent liposuction in the pre-operative area. While in the pre-operative room the patient disrobes and puts on a hospital gown. Photographs are taken with the patient facing the camera and in silhouette to document the pre-operative size and location. After photography, the patient is placed in a supine position and the entire face and neck are cleaned with alcohol. The peripheral border of the hypertrophied parotid gland is outlined with a pen in a continuous line and the incision sites are marked on the sideburn and on the earlobe crease. Depending on how far down the gland extends, a third incision site may be placed anterior to the sternocleidomastoid muscle. Each of the circled sites is injected with 1 cc of lidocaine 1% and epinephrine 1:100,000. The same procedure is repeated on the other side immediately after. The patient is then pre-medicated with hydrocodone 5 mg and alprazolam 0.5 mg by mouth for pain and anxiety relief, and lincomycin 600 mg I.M. for antibiotic prophylaxis.

The pre-treated patient is brought to the operating room and placed in a supine position and prepped and draped in a sterile manner. Tumescent solution is very slowly infiltrated with a small diameter 1-2mm infiltration cannula throughout the entire parotid gland. Approximately 100cc of tumescent fluid is used on each side. Both glands are treated during the same surgical session. After the tumescent fluid is infused, a suction-aspiration technique using 2-3 mm cannulas with an aggressive tip is used to suction the lateral aspect of the parotid (Figure 3B). Generally shorter length cannulas are used with the parotids to gain better suction control. Parotid tissue can be seen entering the suction tubing as white fleshy tissue with a wet tissue appearance. Occasionally this tissue is often intermixed with yellow fat, tumescent fluid and blood if patients with lipodystrophy have infiltration of fat into the parotid gland. The patient is asked to turn his/her head when needed to facilitate access to the glands to be aspirated (Figure 3C). The surgeon's to-and-fro motions are to be continued until it is felt that enough superficial glandular tissue has been removed to restore a normal appearance to the lateral face. During this procedure, we again note that only the superficial part of the parotid is removed. When suctioning over the anterior portion of the

check, it is important to maintain a superficial position in order not to compromise the integrity of the facial nerve. Many patients in conjunction with parotid hypertrophy have submental fat accumulation. Removal of the parotid gland is often combined with a submental fat aspiration during the same procedure.

Generally, no sutures are needed and the incision sites are left open to heal spontaneously. This allows for drainage of the tumescent fluid and generally prevents hematoma and seroma formation. All patients receive a universal chin compression garment in the operating room and afterwards, the patient is transferred to the PACU. In place of a compression garment, an ace bandage may also be used. All compression should include the submental aspect of the neck. After approximately one hour of observation, patients are discharged to the care of a responsible family member or friend; the patient is never allowed to drive home.

During the recovery period, the patient usually rests for 4-5 days at home while continuously wearing the compression garment. The patient returns to the office for a follow-up visit at which time the patient is examined for possible infection, hematomas, seromas, etc. The patient may resume activities of daily living at this time except for those that require rigorous physical effort. Exercise can generally be resumed in 2-3 weeks depending on the patient's signs and symptoms such as tenderness, swelling and bruising which are common following surgery of the head and neck is common. It is recommended that symptoms completely resolve before resuming any strenuous activity especially heavy lifting and running.

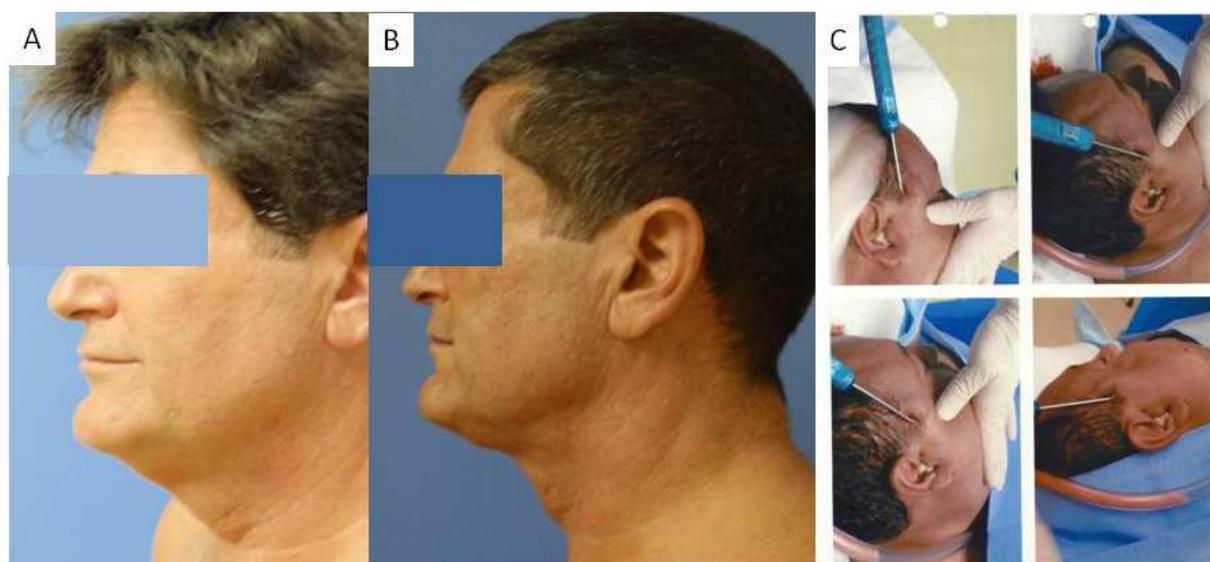


Fig. 3. Surgical lipospiration technique for parotid hypertrophy in HIV-infected men on HAART. A. Pre-surgical parotid hypertrophy, B. Post-surgical resolution of parotid hypertrophy, C. Angling techniques enabled by awake positioning of the patient.

4.5 Outcomes after parotid lipoaspiration

In a recent detailed survey by the authors of one woman and eleven men with an average age of 53.5 ± 2 years seeking lipoaspiration treatment for parotid hypertrophy, three had prior radiation treatment, two had previous surgery and two had both previous radiation

and surgery. Prior to surgery, on a scale of 0-5, five being very affected, 3 being somewhat affected, 1 being a little affected, and zero being not affected, patients felt their appearance was very affected (4.65 ± 0.2), they experienced discomfort (4.0 ± 0.5), a significant change in their lives due to the parotid hypertrophy (4.3 ± 0.4), some depression (3.9 ± 0.4) and social withdrawal (3.9 ± 0.4) and a little problem with chewing (1.4 ± 0.4). Within a year after lipoaspiration, by paired student's t-test, there was a $76.8 \pm 4.7\%$ improvement in appearance (average rating 1.08 ± 0.2 ; $P < 0.0001$), a $69 \pm 8.6\%$ improvement in discomfort (1.09 ± 0.3 ; $P < 0.0001$), a $72.5 \pm 7.9\%$ improvement in how their lives were changed by parotid hypertrophy (1.08 ± 0.2 ; $P < 0.0001$), a $60 \pm 10\%$ improvement in feelings of depression (1.5 ± 0.3 ; $P < 0.001$), a $73.9 \pm 5.4\%$ improvement in social withdrawal (1.09 ± 0.3 ; $P < 0.00001$) and a $45 \pm 12.5\%$ improvement in chewing (0.9 ± 0.1 ; $P = 0.006$). After the surgery, two patients had minor infections at the surgical site, two patients continued to complain of xerostomia due to prior radiation with no new cases of xerostomia, one patient developed thrush, and four patients had some discoloration of the skin at the surgical incision sites. When asked about regrowth of the parotid tissue, ten had none and two had some regrowth. Nine of the patients graded the procedure as completely successful, two said it was somewhat successful and one graded the surgery in-between somewhat and completely successful. In a larger number of patients ($n=72$) treated with the tumescent suction technique under local anesthesia, follow-up questionnaires were obtained in 43 patients. In these 43 patients using a scale of 0 to 5, with 0 being 'no success' and 5 being 'highly successful', the rate of success was on average (\pm sem) 4.8 ± 0.1 . In this larger sampling of patients, there were no incidents of infection, no disturbance in chewing, no complaints of dry mouth and no incidents of recurrence at 3 year follow-up.

5. Discussion

HIV dorsocervical fat pad and HIV-related parotid hypertrophy are frequently seen in clinical practice. The use of novel liposuction techniques in the treatment of these conditions as described in this chapter are advances that result in better outcomes, i.e., better cosmetic results, lower recurrence rates and fewer complications than previously used techniques.

With respect to HIV-related dorsocervical lipodystrophy, tumescent liposuction under general anesthesia, with the patient in the prone position has been shown to be effective, but recurrence is commonly seen, with only partial removal of tissue. It is reasonable to assume that optimal tumor clearance is essential, not only in creating an acceptable cosmetic outcome but also for maintaining long-term results. Due to the fibrous nature of these lesions, aspiration is typically difficult and more laborious as compared to aspiration of non-dystrophic fat. (Davison et al. 2007) It is imperative for the surgeon to position him/herself with respect to the patient in a strategic manner that will facilitate optimal lesion visualization and rigorous cannula dissection while preserving comfort for both the surgeon and the patient. Working with an intubated patient under general anesthesia limits access to the superior portions of the fat pad and those portions in the posterior neck and scalp. For example, when the patient is lying prone under anesthesia, the mass of the dorsocervical fat pad tends to disappear between the scapulae making it difficult access the entire depth of the tissue. We can speculate that the high rate of recurrence may be due to incomplete tissue removal when the patient is in the prone position. We use standard liposuction procedures for suction of the fat pad but position the patient awake and upright with the surgeon

behind the patient. The patient participates by bending and twisting to allow for suction-assisted removal of the maximum amount of tissue. With our method of positioning, the patient can round the shoulders exposing the mass of the tissue. This provides a better cosmetic result, improves patient satisfaction, and decreases the rate of recurrence. Having a cooperative awake patient also eliminates the complications of general anesthesia, which are well known. Since 1997, the authors have treated over 1400 patients with dorsocervical fat pads with the patients seated upright and awake. During this period of time, it appears that less than 10% of these patients have had a recurrence. Difficulty with patient follow-up, however, makes it impossible to be completely accurate with our statistics.

With respect to lipoaspiration of the hypertrophied parotid gland, the goal of the parotid reconstructive procedure is to restore the patient to a more normal appearance; not to remove the entire gland. The procedure is limited to the removal of only that portion of the parotid lying superficial to the facial nerve. Local tumescent anesthesia achieves adequate anesthesia in all patients undergoing suction aspiration for parotid reduction. Using this procedure, our data suggest that patient satisfaction is high and quality of life is improved with minimal complications. Since the tissue being removed during the suction-assisted partial parotidectomy is not primarily fat, the procedure cannot technically be called liposuction. The authors suggest the term "glandular aspiration" or "adeno-suction" to more accurately characterize the operative procedure to reduce parotid size.

We feel the novel positioning during our procedures with patients that are awake and participate in the procedure, should be the standard of care for HIV-related dorsocervical fat pad and parotid hypertrophy. We welcome other surgeons to replicate these procedures in a similar fashion and report their results so as to add to the general experience with these procedures. Our hope is that improvements can be made based on the work we have accomplished to date.

5.1 ICD-9 and CPT Coding

An important issue for patients relates to insurance reimbursement for the correction of HIV-lipodystrophy and parotid hypertrophy. Using standard liposuction codes (15887 liposuction, truncal and 15886 liposuction, facial) are met with consistent denials from insurance companies as these codes imply procedures performed for cosmetic purposes. Insurance carriers understandably do not reimburse for cosmetic procedures such as liposuction performed to eliminate "love handles" or abdominal fat to provide a trimmer waistline. However, the conditions as described in this chapter are clearly reconstructive as they are intended to correct a deformity caused by a disease. State health and safety codes clearly define the difference between cosmetic and reconstructive procedures (e.g., California Health and Safety Code Section 1367.22). Although during the procedures, the equipment and techniques are the same as in cosmetic liposuction, we feel it is justified to code these procedures for reimbursement of HIV lipodystrophy and HIV partial parotidectomy as partial excisions, excisions and radical excisions as appropriate to the individual patient (refer to Table 1 for guidance in diagnostic and procedure coding decisions). We hope the health insurance industry can broaden their understanding of the damaging effects of people living with HIV lipodystrophy and parotid hypertrophy and reimburse as they would for other reconstructive procedures such as breast reconstruction following mastectomy or cleft palate surgery

CPT Code	Description
21555	Excision, tumor, soft tissue of neck or anterior thorax, subcutaneous; ≤ 3 cm
21557	Radical resection of tumor (e.g., malignant neoplasm), soft tissue of neck or anterior thorax; < 5 cm
21558	Radical resection of tumor (eg, malignant neoplasm), soft tissue of neck or anterior thorax; ≥ 5 cm or greater
21930	Excision, tumor, soft tissue of back or flank, subcutaneous; 3 cm or greater
21935	Radical resection of tumor (eg, malignant neoplasm), soft tissue of back or flank; ≤ 5 cm
21936	Radical resection of tumor (eg, malignant neoplasm), soft tissue of back or flank; ≥ 5 cm
42410	Excision of parotid tumor or parotid gland; lateral lobe, without nerve dissection (parotidectomy)
2011 ICD-9	Description
042	Human immunodeficiency virus (HIV) disease
272.6	Lipodystrophy; a collection of rare conditions resulting from defective fat metabolism and characterized by atrophy of the subcutaneous fat; includes total, congenital or acquired, partial, abdominal infantile, and localized lipodystrophy.
235	Parotid hypertrophy (neoplasm of uncertain behavior of major salivary glands)

Table 1. Reimbursement codes for the surgical management of the HIV positive patient.

6. Summary

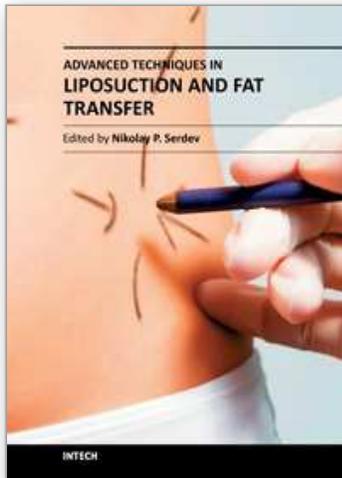
The main goal of lipoaspiration of the dorsocervical fat pad and parotid hypertrophy as part of HIV infection and HAART treatment is to improve patient outcomes and safety. It is also important to preserve the comfort of the surgeon while providing a cost effective procedure that is affordable by the patient and covered by insurance. These lipoaspiration procedures described here avoid general anesthesia and include the patient as a direct participant in the procedure to ensure maximal removal of adipose tissue in the dorsocervical fat pad, and accurate removal of glandular tissue in the case of parotid hypertrophy. Our experience in the use of these procedures is that patients rate their experience and satisfaction with the procedures as very high.

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Advanced Techniques in Liposuction and Fat Transfer

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Liposuction is the first cosmetic procedure to change beautification surgery from open extensive excision surgery into a more atraumatic closed one. It gave rise to the modern understanding of minimally scarring and minimally invasive surgery and changed the understanding and preferences of both patients and doctors. It also became the most common procedure in cosmetic surgery world-wide, practiced by an increased number of physicians from various specialties. The techniques of fat grafting, closely bound with liposuction, have found widespread application and fat stem cells seem to be changing the future of many areas in medicine. Turning the pages, the reader will find a lot of information about advances, tips and tricks, as well as important milestones in the development of the different methods available, such as classic, power, ultrasound, laser and radio-frequency assisted liposuction etc. Most useful anesthesia techniques are described and discussed, and guidelines have been established for medical indications. Special attention is paid to good patient selection, complications and risks.

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